

## CLAIMS

What is claimed is:

- 5    1. An up-conversion modulation loop for multi-mode  
mobile communication being used to perform  
signal modulation and processing so as to  
transmit the signal by using a single power  
emitter, the loop comprising:
- 10        a phase modulator for receiving a feedback  
signal and a modulation phase signal, and  
comparing the two signal so as to generate a  
difference;
- a first filter for receiving the difference
- 15        generated by the phase modulator, and  
transmitting it to a frequency divider;
- a first frequency divider for receiving the

signal transmitted by the first filter so as  
to perform the signal down-conversion, and  
transmitting the signal to a phase frequency  
comparator;

5 a phase frequency comparator for receiving the  
signal transmitted by the first frequency  
divider and a second down-conversion signal so  
as to compare the signal phases, and  
transmitting the signal to a loop low-pass  
10 filter;

a loop low-pass filter for receiving the signal  
transmitted by the phase frequency comparator  
so as to perform the signal filtering, and  
transmitting the signal to a second adder;

15 a second adder for receiving the signals  
transmitted by the loop low-pass filter and a

signal amplifier so as to synthesize the signals,  
and transmitting the synthesized signal to a  
voltage controlled oscillator;  
a voltage controlled oscillator for receiving  
5 the signal transmitted by the second adder so  
as to perform the signal modulation and make  
the phases of the input signal and the output  
signal consistent, and outputting the signal  
to a power amplifier for signal emitting;  
10 a phase detector for receiving the modulation  
phase signal so as to detect the signal phase;  
a signal amplifier for receiving the detection  
signal transmitted by the phase detector and  
the signal outputted by a signal transmitter  
15 so as to perform the signal amplifying, and  
transmitting the amplified signal to the second

adder;

a signal transmitter for receiving the  
difference transmitted by the phase modulator,  
and transmitting it to the signal amplifier;

5 wherein the multi-mode signal modulation is  
accomplished and the modulated signal is  
transmitted to the next level processing unit  
for signal emission.

2. The up-conversion modulation loop of claim 1,

10 wherein the phase modulator comprises:

a phase converter for receiving the feedback  
signal, and performing the phase generation so  
as to output a in-phase feedback signal and a  
quadrature phase feedback signal;

15 a first mixer for receiving the in-phase  
feedback signal outputted by the phase

converter and a first modulation phase signal  
outputted from outside of the phase modulator,  
and then performing the mixing so as to  
outputting the mixed signal to a first adder;  
5 a second mixer for receiving the quadrature  
phase feedback signal outputted by the phase  
converter and a second modulation phase signal  
outputted from outside of the phase modulator,  
and then performing the mixing so as to output  
10 the mixed signal to the first adder;  
a first adder for receiving the mixed signals  
outputted by the first mixer and the second  
mixer, and then performing the signal comparing  
so as to output the signal to the first filter  
15 and the signal transmitter outside the phase  
modulator.

3. The up-conversion modulation loop of claim 2,  
wherein the feedback signal is fed back to the  
phase converter in the phase modulator after a  
second filter receives the signal transmitted  
5 by a third mixer and perform the frequency  
filtering.
4. The up-conversion modulation loop of claim 3,  
wherein the third mixer is used for receiving  
the signal outputted by the voltage controlled  
10 oscillator, and mixing it with a first  
down-conversion signal so as to transmit the  
mixed signal to the second filter.
5. An up-conversion modulation loop for multi-mode  
mobile communication being used to perform  
15 signal modulation and processing so as to emit  
the signal by using a single power emitter, the

loop comprising:

a phase modulator for receiving a feedback signal  
and a modulation phase signal, and adding the  
two signals so as to generate a difference;

5     a first filter for receiving the difference  
generated by the phase modulator, and  
transmitting it to a frequency divider;

a first frequency divider for receiving the  
signal transmitted by the first filter so as to  
10     perform the signal down-conversion, and  
transmitting the signal to a phase frequency  
comparator;

a second frequency divider for receiving a first  
down-conversion signal so as to perform the  
15     frequency division on the signal, and then  
outputting the signal to the phase frequency

comparator;

a phase frequency comparator for receiving the signals processed by the first frequency divider and the second frequency divider so as to compare the signal phases, and then outputting the signal to a loop low-pass filter;

a loop low-pass filter for receiving the signal transmitted by the phase frequency comparator so as to perform the signal filtering, and transmitting the signal to a second adder;

a second adder for receiving the signals transmitted by the loop low-pass filter and a signal amplifier so as to synthesize the signals, and transmitting the synthesized signal to a voltage controlled oscillator;

a voltage controlled oscillator for receiving



the signal transmitted by the second adder so  
as to perform the signal modulation and make the  
phases of the input signal and the output signal  
consistent, and outputting the signal to a power  
5 amplifier for signal emitting;  
a phase detector for receiving the modulation  
phase signal so as to detect the signal phase;  
a signal amplifier for receiving the detection  
signal transmitted by the phase detector and the  
10 signal outputted by a signal transmitter so as  
to perform the signal amplifying, and  
transmitting the amplified signal to the second  
adder;  
a signal transmitter for receiving the  
15 difference transmitted by the phase modulator,  
and transmitting it to the signal amplifier;

a signal amplitude detector for receiving the modulation phase signal so as to detect the signal amplitude, and outputting it to the power amplifier;

5 wherein the multi-mode signal modulation is accomplished and the modulated signal is transmitted to the power amplifier for signal emission.

6. The up-conversion modulation loop of claim 5,

10 wherein the phase modulator comprises:

a phase converter for receiving the feedback signal, and performing the phase modulation so as to output a in-phase feedback signal and a quadrature phase feedback signal;

15 a first mixer for receiving the in-phase feedback signal outputted by the phase converter and a

first modulation phase signal outputted from  
outside of the phase modulator, and then  
performing the mixing so as to outputting the  
mixed signal to a first adder;

5 a second mixer for receiving the quadrature  
phase feedback signal outputted by the  
phase converter and a second modulation  
phase signal outputted from outside of the  
phase modulator, and then performing the  
10 mixing so as to output the mixed signal to  
the first adder;

a first adder for receiving the mixed  
signals outputted by the first mixer and  
the second mixer, and then performing the  
15 signal comparing so as to output the signal  
to the first filter and the signal

transmitter outside the phase modulator.

7. The up-conversion modulation loop of claim

6, wherein the feedback signal is fed back

to the phase converter in the phase

5 modulator after a second filter receives

the signal transmitted by a third mixer and

perform the frequency filtering.

8. The up-conversion modulation loop of claim

7, wherein the third mixer is used for

10 receiving the signal outputted by the

voltage controlled oscillator, and mixing

it with a first down-conversion signal so

as to transmit the mixed signal to the second

filter.

15 9. The up-conversion modulation loop of claim

5, wherein the signal amplitude detector

further comprises a switch for detecting the amplitude of the multi-mode frequency signal.

10. An up-conversion modulation loop for the multi-mode mobile communication being used for performing the signal modulation, detection and transmission so as to integrate the global system for mobile communication (GSM) and the wideband code division multiple access (WCDMA) for signal emission, the loop performing the following

10 steps:

transmitting a modulation phase signal wherein

a first modulation phase signal and a second

modulation phase signal are transmitted to a

phase modulator and a phase detector, and the

15 phase modulator is used for comparing the signals,

and the phase detector is used for detecting the

phases of the two modulation phase signals;  
generating a difference after the signal  
comparing by the phase modulator;  
transmitting the generated difference to a  
5 signal transmitter and a first filter;  
comparing the signal frequencies and filtering  
the signals wherein the first filter transmits  
the difference to a phase frequency comparator  
and a loop low-pass filter so as to perform the  
10 comparing and the filtering;  
synthesizing the signals wherein a first adder  
is used for synthesizing the signals, and  
transmitting the synthesized signal to a voltage  
controlled oscillator;  
15 modulating the phase frequencies wherein the  
voltage controlled oscillator is used for

modulating the input and output signals so as  
to make the modulated phases of the output and  
input signals consistent;

outputting and emitting the signal to output the  
5 modulated signal with consistent phase to a power  
amplifier so as to accomplish the up-conversion  
modulation for the multi-mode mobile  
communication.

11. The up-conversion modulation loop of claim 10,  
10 wherein the voltage controlled oscillator  
further outputs the signal to a third mixer, and  
the third mixer is used for receiving a first  
down-conversion signal from outside, and  
outputting a feedback signal to a second filter,  
15 and after the second filter processes the signal,  
the feedback signal is outputted to the phase

modulator.

12. The up-conversion modulation loop of claim 10,

wherein the phase modulator further comprises:

a phase converter for receiving the feedback

5 signal, and performing the phase modulation so

as to output a in-phase feedback signal and a

quadrature phase feedback signal;

a first mixer for receiving the positive phase

feedback signal outputted by the phase converter

10 and a first modulation phase signal outputted

from outside of the phase modulator, and then

performing the mixing so as to outputting the

mixed signal to a first adder;

a second mixer for receiving the quadrature

15 phase feedback signal outputted by the

phase converter and a second modulation



phase signal outputted from outside of the  
phase modulator, and then performing the  
mixing so as to output the mixed signal to  
the first adder;

5       a first adder for receiving the mixed  
signals outputted by the first mixer and  
the second mixer, and then performing the  
signal comparing so as to output the signal  
to the first filter and the signal  
10       transmitter outside the phase modulator.

13. The up-conversion modulation loop of claim 10,  
wherein the modulation phase signal is further  
inputted into a signal amplitude detector, and  
the signal amplitude detector will detect the  
15       amplitude of the signal, and output the signal  
to the power amplifier.